

**SONY**

ELECTRONIC VIEWFINDER

**BVF-V20W**

**BVF-V20WCE**

MAINTENANCE MANUAL

2nd Edition (Revised 1)

Serial No. 11261 and Higher (BVF-V20W)

Serial No. 42441 and Higher (BVF-V20WCE)

### **⚠ 警告**

このマニュアルは、サービス専用です。

お客様が、このマニュアルに記載された設置や保守、点検、修理など行くと感電や火災、人身事故につながるがあります。

危険をさけるため、サービストレーニングを受けた技術者のみご使用ください。

### **⚠ WARNING**

This manual is intended for qualified service personnel only.

To reduce the risk of electric shock, fire or injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

### **⚠ WARNING**

Die Anleitung ist nur für qualifiziertes Fachpersonal bestimmt.

Alle Wartungsarbeiten dürfen nur von qualifiziertem Fachpersonal ausgeführt werden. Um die Gefahr eines elektrischen Schlages, Feuergefahr und Verletzungen zu vermeiden, sind bei Wartungsarbeiten strikt die Angaben in der Anleitung zu befolgen. Andere als die angegebenen Wartungsarbeiten dürfen nur von Personen ausgeführt werden, die eine spezielle Befähigung dazu besitzen.

### **⚠ AVERTISSEMENT**

Ce manuel est destiné uniquement aux personnes compétentes en charge de l'entretien. Afin de réduire les risques de décharge électrique, d'incendie ou de blessure n'effectuer que les réparations indiquées dans le mode d'emploi à moins d'être qualifié pour en effectuer d'autres. Pour toute réparation faire appel à une personne compétente uniquement.

### **X-RAY RADIATION WARNING**

Be sure that parts replacement in the high voltage block and adjustments made to the high voltage circuits are carried out precisely in accordance with the procedures given in this manual.

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## Manual Structure

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### Purpose of this manual

This manual is the maintenance manual for Electronic Viewfinder BVF-V20W/V20WCE.

This manual describes the information items necessary when the unit is supplied and installed, items that premise the service based on the components parts such as alignment, schematic diagrams, board layouts and spare parts lists, assuming use of system and service engineers.

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### Contents

This followings are summaries of the each section for understanding the manual.

#### **Section 1 Service Overview**

Describes information about board locations, connector input/output signals, cleaning, replacement of CRT.

#### **Section 2 Electrical Allignment**

Describes general information for electrical adjustments and the adjustments procedures of this unit.

#### **Section 3 Spare Parts**

Describes parts list, exploded views, supplied accessories list used in the unit.

#### **Section 4 Semiconductor Pin Assignments**

Describes function diagrams and pin names of semiconductor used in the unit.

#### **Section 5 Diagrams and Board Layouts**

Describes overall block diagram, frame wiring and board layouts for every circuit board.

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### Relative manual

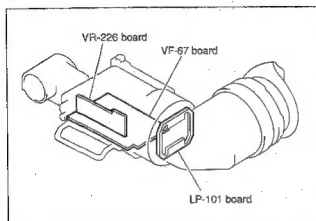
Besides this maintenance manual the following manual is available for this unit.

- **Operation Manual (Supplied with this unit)**

This manual is necessary for application and operation of this unit.

## Section 1 Service Overview

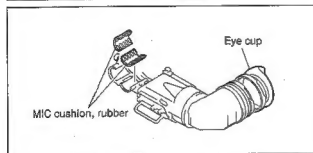
### 1-1. Location of Printed Circuit Boards



### 1-2. Periodic Replacement Parts

Parts listed below are periodic replacement parts. They are subject to cracks with the lapse of time. Check sometimes by visual, and replace as necessary.

Name	Sony Part No.
MIC cushion, rubber	3-692-138-0X *1
Eye cup (S)	3-723-079-0X



\*1 It is recommended that the MIC cushions are replaced in pairs. In this case, please order two pieces.

### 1-3. Connector Input/Output Signals

VF (20P MALE)



(External view)

Pin No.	Signal	I/O	Specifications
1	VTR SAVE IND	IN	GND: Indicator lights OPEN: Indicator goes out
2	ABNORMAL IND	IN	GND: Indicator lights OPEN: Indicator goes out
3	16:9 MODE	IN	GND: 16:9 OPEN: 4:3
4	REC (L) IND	IN	9 V: Indicator lights GND or OPEN: Indicator goes out
5	NC		
6	CCIR/EIA	IN	9.3 V: CCIR GND: EIA
7	DISPLAY	OUT	ON: OPEN OFF: GND
8	G TALLY	IN	5 V: Indicator lights GND or OPEN: Indicator goes out
9	NC		
10	NC		
11	ZEBRA	OUT	ON: GND OFF: 5 V
12	VF VIDEO (X)	IN	1.0 V p-p Zi = 75 $\Omega$
13	NC		
14	NC		
15	NC		
16	BATT IND	IN	5 V: Indicator lights GND or OPEN: Indicator goes out
17	TALLY IND	IN	9 V: Indicator lights GND or OPEN: Indicator goes out
18	+9.3 V (VF)	IN	REG +9.3 V
19	GND		GND
20	NC		

This unit normally operates with the above input signals. Cameras described in this manual can output the signals satisfying the specifications.

## 1-4. Cleaning

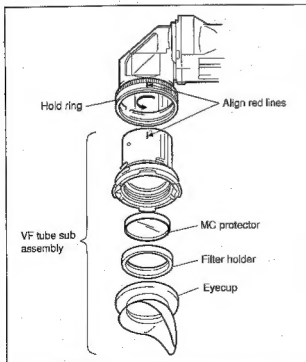
### 1-4-1. Cleaning of Viewfinder

By extracting VF tube sub assembly, lens and MC protector can be easily cleaned. And also dust on the CRT surface or mirror can be easily cleaned off.

1. Turn the hold ring to the left and extract the VF tube sub assembly.
2. Detach the eyecup.
3. Remove the MC protector with the filter holder.
4. Clean the lens and MC protector with a commercially available camera lens cleaner. Blow off dust with a blower carefully so as not to flaw the mirror.
5. After the cleaning is completed, install by reversing the preceding steps. Align red lines of the VF tube and VF tube sub assembly when inserting, and turn the hold ring to the right until it locks.

#### Note

- Do not use any type of solvent, such as alcohol, benzine or thinner to remove stains.
- Be sure to attach the eyecup to the VF, or the MC protector may come off.
- To protect the viewfinder lens from drops, put the MC protector in the filter holder and attach the eyecup securely.



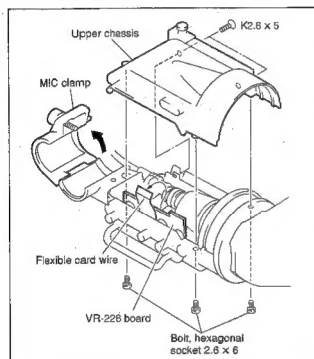
### 1-4-2. Care After Using at Special Environment

It is recommended to check the following items after gathering the news at seaside, dust area or spa.

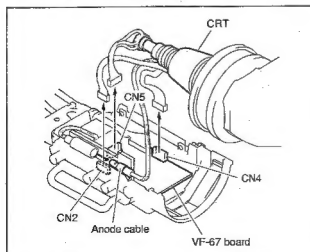
1. Clean off sand and other dust in the unit carefully.
2. Do not allow salt in seawater or sulfur in spa to contact a not-painted surface of the cabinet. They may cause to corrode. Clean with alcohol immediately if contacted.
3. Clean the connection surface of connectors.
4. Carry out the common operation check.

## 1-5. Replacement of CRT

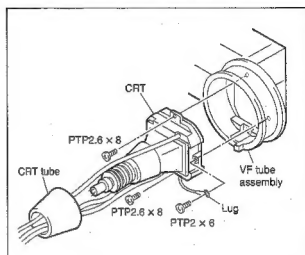
1. Loosen the screw of the MIC clamp and open the MIC clamp.
2. Remove the two screws (K2.6 × 5).
3. Remove the three hexagonal socket bolts (2.6 × 6) and remove the upper chassis.
4. Disconnect the flexible card wire on the VR-226 board. (How to disconnect the flexible card wire, refer to Section 1-6.)



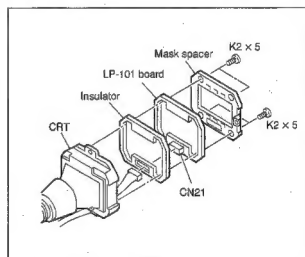
5. Disconnect the three connectors CN2, CN4 and CN5 on the VF-67 board, and anode cable.



6. Remove the three screws and remove the CRT from the VF tube assembly.
7. Remove the CRT tube from the CRT.



8. Remove the four screws (K2 × 5) and remove the mask spacer.
9. Disconnect the connector CN21 on the LP-101 board.





1-5. Replacement of CRT

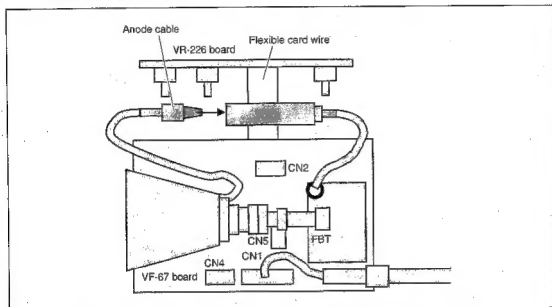
10. Install a new CRT in the reverse procedures of removal.

When installing the CRT, route the harness using the following procedure.

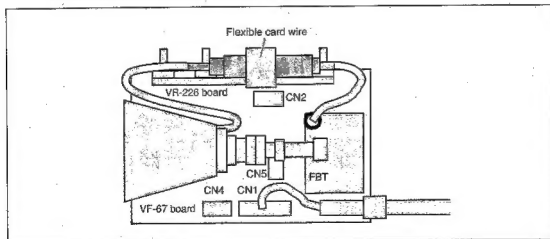
The following figures show the opposite side of the CRT shown in the figures of the removal procedure.

(1) Anode cable

Connect the anode cable.

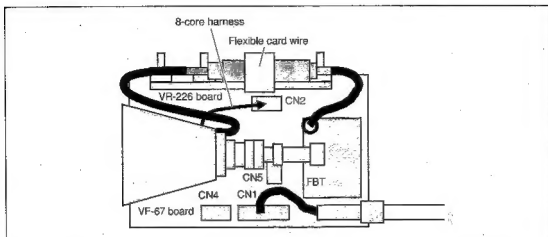


Turning the VR-226 board 180°, attach it to the cabinet. Bite the anode cable between the flexible card wire and the VR-226 board to secure it.



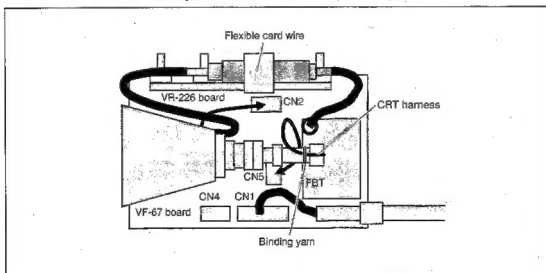
## (2) Harness to connector CN2 (8-core harness)

Connect the 8-core harness to connector CN2 on the VF-67 board through the upper side of the anode cable.



## (3) Harness to connector CN5 (CRT harness)

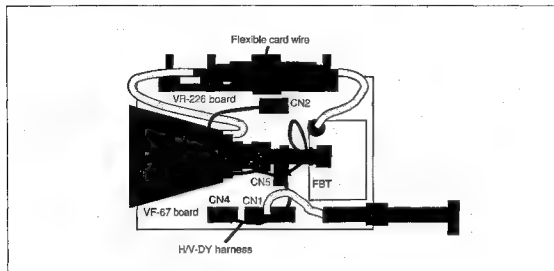
Connect the CRT harness (blue, orange, brown, red) to connector CN5 on the VF-67 board, and fix the CRT harness to the portion of the CRT neck using a binding yarn.



#### 1-5. Replacement of CRT

##### (4) Harness to connector CN4 (H/V-DY harness)

Connect the H/V-DY harness (brown, red, orange, blue, black) to connector CN4 on the VF-67 board through the lower side of the VF cable.



#### **Note**

When installing the upper chassis, take care not to clamp the harness between upper and lower chassis.

After replacing the CRT, be sure to perform the electrical adjustment. (Refer to Section 2.)

#### **Note**

After adjustments are completed, paint-lock the centering magnet.

## 1-6. Disconnecting/Connecting Flexible Card Wire

The flexible card wire is used between the VF-67 board and VR-226 board. Take care not to break this flexible card wire. This shorten the wire life.

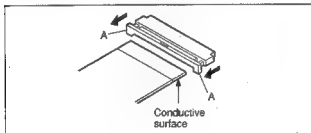
### Disconnecting

1. Turn off the power.
2. Slide portions A in the direction of the arrows to unlock and pull out the flexible card wire.

### Connecting

#### Note

- Be careful not to insert the flexible card wire obliquely.
  - Check that the conductive surface of the flexible card wire is not soiled with dust.
1. Slide portions A in the direction of the arrows and insert the flexible card wire as far as it will go with the conductive surface down.
  2. Slide portions A in the reverse direction to lock.



## 1-7. Notes on Spare Parts

### 1. Safety Related Components Warning

Components marked  $\Delta$  are critical to safe operation. Therefore, specified parts should be used in the case of replacement.

### 2. Standardization of Parts

Some spare parts supplied by Sony differ from those used for the unit. These are because of parts commonality and improvement. Parts list has the present standardized repair parts.

### 3. Stock of Parts

Parts marked with "o" at SP(Supply Code) column of the spare parts list may be not stocked. Therefore, the delivery date will be delayed.

### 4. Units Representation

The following represented units are changed or omitted in writing.

Units	Representation	
Capacitance	$\mu\text{F}$	$\mu\text{F}$
Inductance	$\mu\text{H}$	$\mu\text{H}$
Resistance	$\Omega$	Abbreviation
Temperature	$^{\circ}\text{C}$	XXX-DEG-C

### 5. Destination Representation

The part indicated "For J/UC/EK" in the spare parts list is used in the unit written below.

For UCJ : The part is used in a unit for U.S.A., Canada and Japan.

For CE : The part is used in a unit for regions except the above countries.

## Section 2

### Electrical Alignment

#### 2-1. Electrical Adjustment Using a Camcorder

##### 2-1-1. Notes on Adjustment

- When performing adjustment, read throughly the following comments.
  - The calibration of all measuring equipment should be completed.
  - Peripheral equipment (camera, and others) alignment should be completed.
  - "2-1-4. Settings for adjustment" should be completed.
  - Turn off the power before extending the plug-in board using the extension board.

#### WARNING

There is a danger of an electric shock around the CRT due to high voltage. Therefore, do not touch the CRT. Be very careful when service in a live.

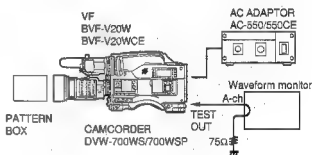
- Change the Picture Frame mode (4:3/16:9)
  - When the unit is put into the 16:9 mode, set as follows.  
Setting menu  
PAGE : WIDE SCREEN  
ITEM : 16:9/4:3 MODE → 16:9
  - When the unit is put into the 4:3 mode, set as follows.  
Setting menu  
PAGE : WIDE SCREEN  
ITEM : 16:9/4:3 MODE → 4:3

##### 2-1-2. Equipment/Fixtures

- Camcorder  
DVW-700WS/700WSP  
or DNW-90WS/90WSP
- AC adaptor  
AC-550/550CE or equivalent
- Oscilloscope  
Tektronix 2465B or equivalent
- Waveform monitor  
Tektronix 1750/1751 or equivalent
- B/W monitor
- Digital voltmeter  
Advantest TR6845 or equivalent
- Frequency counter  
Advantest TR5821AK or equivalent

Fixtures	Sony P/N
Pattern box "PTB-500"	J-6026-140-B
Resolution chart (4:3)	J-6028-100-A
Resolution chart (16:9)	J-6394-320-A
VF extension harness	J-6395-050-A

##### 2-1-3. Connections



##### 2-1-4. Settings for Adjustment

Before adjustment, set switches as follows. If the setting of the GAIN switch is changed from the factory-set value, reset it to its original value, reset it to its original value by referring to the operation manual.

[External]

Side panel:

VTR SAVE/STBY switch	→ STBY
GAIN switch	→ L (0 dB)
OUTPUT/DCC switch	→ CAM/OFF
WHITE BAL switch	→ PRST
MENU/ON/OFF/PAGE switch	→ OFF

Front panel:

SHUTTER switch	→ OFF
FILTER selector	→ 1, B

[Lens]

LENS	→ MANU
IRIS	→ C (CLOSE)

(To be continued)

[Internal]

Put the unit into the ENG mode.

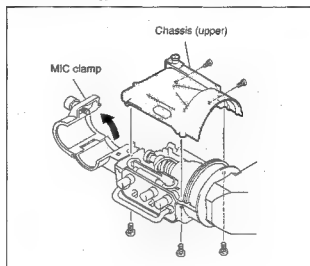
**Note** Refer to the maintenance manual part 1 of camcorder as for setting to the ENG mode.

Setting menu:

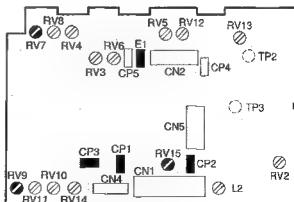
- MASTER GAIN
  - LOW → 0 dB
  - MID → 9 dB
  - HIGH → 18 dB
- FUNCTION 1/2
  - DETAIL → ON
  - SKIN TONE DETAIL → OFF
  - MATRIX → OFF
  - GAMMA → ON
  - CHROMA → ON
  - TEST SAW → OFF
- FUNCTION 2/2
  - GENLOCK → ON
  - CAM RET → OFF
  - FILTER INH → ON
- TEST OUT
  - ENC
- WIDE SCREEN
  - 16:9/4:3 MODE → 4:3
  - VF ASPECT → AUTO
- LEVEL 3/9
  - KNEE → ON
  - WHITE CLIP → ON
- LEVEL 4/9
  - I → ON  
(for DVW-700WS)
  - Q → ON  
(for DVW-700WS)
  - R-Y → ON  
(for DVW-700WSP,  
DNW-90WS/90WSP)
  - B-Y → ON  
(for DVW-700WSP,  
DNW-90WS/90WSP)

## 2-1-5. Extending Viewfinder

1. Turn off the power switch on the camera before performing adjustment.
2. Remove the viewfinder from the camera, then remove the chassis (upper).



3. Connect the viewfinder to the camera using the VF extension harness (J-6395-050-A).
4. Turn on the main power switch.



VF-67 BOARD (A SIDE)

### 2-1-6. Vertical Hold Adjustment

#### Preparation

- Extract the ES-11 board from the camcorder.  
(DNW-90WS/90WSP)
- Extract the IF-443 board from the camcorder.  
(DVW-700WS/700WSP)

#### Adjustment Procedure

- Equipment : Frequency counter  
Test point : CP3/VF-67  
GND : E1/VF-67  
Adjustment point :  $\odot$ RV9 (V-HOLD) /VF-67  
Specification :  $48.0 \pm 0.5$  Hz (For NTSC)  
 $38.0 \pm 0.5$  Hz (For PAL)

#### Setting after Adjustment

- Attach the ES-11 board to the camcorder.  
(DNW-90WS/90WSP)
- Attach the IF-443 board to the camcorder.  
(DVW-700WS/700WSP)

### 2-1-7. Horizontal Hold Adjustment

#### Preparation

- Extract the ES-11 board from the camcorder.  
(DNW-90WS/90WSP)
- Extract the IF-443 board from the camcorder.  
(DVW-700WS/700WSP)

#### Adjustment Procedure

- Equipment : Frequency counter  
Test point : CP1/VF-67  
GND : E1/VF-67  
Adjustment point :  $\odot$ RV7 (H-HOLD) /VF-67  
Specification :  $15.73 \pm 0.05$  kHz (For NTSC)  
 $15.63 \pm 0.05$  kHz (For PAL)

#### Setting after Adjustment

- Attach the ES-11 board to the camcorder.  
(DNW-90WS/90WSP)
- Attach the IF-443 board to the camcorder.  
(DVW-700WS/700WSP)

### 2-1-8. Sub Contrast Adjustment

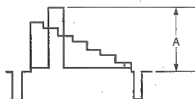
#### Preparation

- OUTPUT/DCC switch (on the camcorder side panel)  
→ BARS/OFF
- CONTRAST control → Fully clockwise

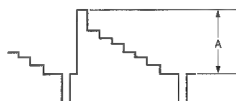
#### Adjustment Procedure

- Equipment : Oscilloscope  
Test point : CP2/VF-67  
GND : E1/VF-67  
Adjustment point :  $\odot$ RV15 (SUB CONTRAST) /VF-67  
Specification :  $A=10.0 \pm 0.1$  V p-p (without sync)

#### For NTSC model



#### For PAL model



## 2-1-9. Bright Set Adjustment

### Preparation

- Set to the 4:3 mode.
- OUTPUT/DCC switch (on the camcorder side panel)  
→ BARS/OFF
- BRIGHT control → Mechanical center
- CONTRAST control → Mechanical center

### Adjustment Procedure

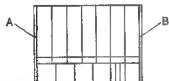
1. Adjustment point : **RV2 (SUB BRIGHT) / VF-67**  
Specification : Refer to lower figure
2. Set to the 16:9 mode.
3. Adjustment point : **RV4 (SUB BRIGHT WIDE) / VR-226**  
Specification : Refer to lower figure

#### For NTSC model

##### Adjustment method

: Adjust **RV2 (RV4)** so that the black of portions A (front-porch) or B (back-porch) on the viewfinder screen can be barely discriminated black.

Portions A, B and the blanking of A or B's side cannot be discriminated.



#### For PAL model

##### Adjustment method

: Adjust **RV2 (RV4)** so that the black of portions A (front-porch) or B (back-porch) on the viewfinder screen can be barely discriminated black.

Portions A, B and the blanking of A or B's side cannot be discriminated.



## 2-1-10. Focus Adjustment

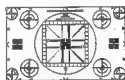
### Note

This adjustment, "2-1-11. Heater Voltage Adjustment" and "2-1-12. Picture Frame Adjustment" affect each other. Therefore, repeat these adjustments until these specifications are satisfied.

### Preparation

- Set to the 16:9 mode.
- Shoot the resolution chart (16:9) so that the chart frame is aligned with the underscanned monitor frame.
- Adjust the iris of the lens so that the output level (peak-to-peak) at TEST OUT connector/camcorder with the waveform monitor.

Spec. :  $70 \pm 2$  IRE (for NTSC)  
 $490 \pm 14$  mV (for PAL)



(Viewfinder screen)

- BRIGHT control → Mechanical center
- CONTRAST control → Mechanical center

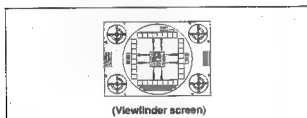
### Adjustment Procedure

1. Adjustment point : **RV5 (FOCUS SET) / VF-67**  
Adjustment method : Turn **RV5** fully counterclockwise, and slowly turn it clockwise to adjust the best focus position.
2. Confirm that the best focus can be obtained irrespective of its BRIGHT and CONTRAST controls setting.
3. Set to the 4:3 mode.



4. Set camera and viewfinder as follows.
  - Shoot the resolution chart (4:3) so that the chart frame is aligned with the underscanned monitor frame.
  - Adjust the iris of the lens so that the output level (peak-to-peak) at TEST OUT connector/camcorder with the waveform monitor.

Spec. :  $70 \pm 2$  IRE (for NTSC)  
 $490 \pm 14$  mV (for PAL)



- BRIGHT control → Mechanical center
  - CONTRAST control → Mechanical center
  - Confirm that the focus operation can be performed.
5. Equipment : Digital voltmeter
    - Test point : TP2/VF-67 (B SIDE)
    - GND : E1/VF-67
    - Adjustment point : RV12 (OPAMP-ADJ) /VF-67
    - Specification :  $6.0 \pm 0.2$  V dc

#### Note

After adjustments are completed, confirm that the best focus can be obtained irrespective of its BRIGHT and CONTRAST controls setting.

## 2-1-11. Heater Voltage Adjustment

### Note

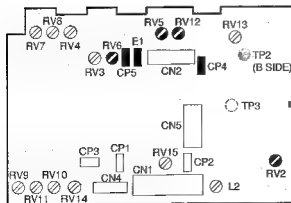
This adjustment, "2-1-10. Focus Adjustment" and "2-1-12. Picture Frame Adjustment" affect each other. Therefore, repeat these adjustments until these specifications are satisfied.

### Preparation

- Set to the 4:3 mode.
- BRIGHT control → Mechanical center
- CONTRAST control → Mechanical center
- PEAKING control → Mechanical center
- Iris of the lens: Close

### Adjustment Procedure

1. Equipment : Digital voltmeter
  - Test point : CP4 (H1)/VF-67
  - CP5 (H2)/VF-67
  - Adjustment point : RV6 (HEATER)/VF-67
  - Specification :  $635 \pm 15$  mV dc
2. Confirm that the specification is met and horizontal noise irrespective of its BRIGHT, CONTRAST and PEAKING controls setting.
3. Set to the 16:9 mode.
4. Confirm that the specification is met and horizontal noise irrespective of its BRIGHT, CONTRAST and PEAKING controls setting.



VF-67 BOARD (A SIDE)

## 2-1-12. Picture Frame Adjustment

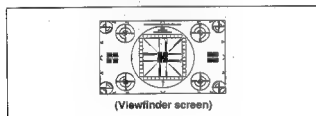
### Note

This adjustment, "2-1-10. Focus Adjustment" and "2-1-11. Heater Voltage Adjustment" affect each other. Therefore, repeat these adjustments until these specifications are satisfied.

### Preparation

- Set to the 16:9 mode.
- Shoot the resolution chart (16:9) so that the chart frame is aligned with the underscanned monitor frame.
- Adjust the iris of the lens so that the output level (peak-to-peak) at TEST OUT connector/camcorder with the waveform monitor.

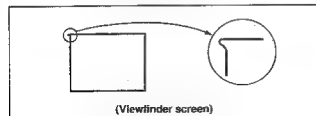
Spec.:  $70 \pm 2$  IRE (for NTSC)  
 $490 \pm 14$  mV (for PAL)



- BRIGHT control → Mechanical center
- CONTRAST control → Mechanical center

### Adjustment Procedure

1. Adjustment point : **RV7 (H-HOLD) /VF-67**  
 Specification : If the upper left corner of the picture is distorted, makes right angle.
2. Adjustment point : **RV11 (V-LIN) /VF-67**  
**RV13 (H-LIN) /VF-67**

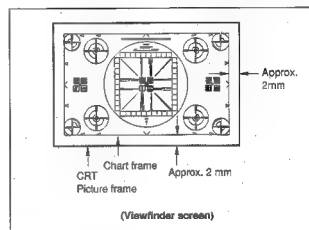


Specification : Minimize the distortion of the four circles at the corners of the resolution chart.

(To be continued)

3. Adjustment point : **RV4 (H-SIZE WIDE) /VF-67**  
**RV10 (V-SIZE) /VF-67**  
**Centering magnet**

Adjustment method : Adjust **RV4** and **RV10** so that the positions of the resolution chart are as shown below. Turn the centering magnet only when the left and lower corners cannot be adjusted.



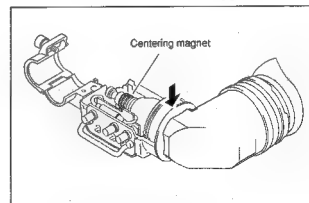
4. Check that the required specification is met.

Test point : **TP3/VF-67 (B SIDE)**

Specification :  $8.80 \pm 0.20$  V dc

If not, repeat from step 3.

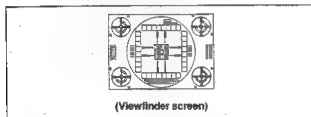
5. Place the VF tube to the lower chassis as shown below, and confirm that the picture is in the center of the viewfinder in the normal installing position.



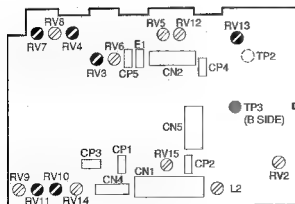
### Note

When the centering magnet is turned, paint-lock it again.

6. Set to the 4:3 mode.
7. Shoot the resolution chart (4:3) so that the chart frame is aligned with the underscanned monitor frame.
8. Adjust the iris of the lens so that the output level (peak-to-peak) at TEST OUT connector/camcorder.  
Spec. :  $70 \pm 2$  IRE (for NTSC)  
 $490 \pm 14$  mV (for PAL)



9. Adjustment point :  $\odot$ RV3 (H-SIZE) /VF-67  
Specification : Minimize the distortion of center circle and the four circles at the corners of the resolution chart.
10. Check that the required specification is met.  
Test point : TP3/VF-67 (B SIDE)  
Specification :  $6.95 \pm 0.25$  V dc  
If not, repeat from step 9.



VF-67 BOARD (A SIDE)

## 2-2. Electrical Adjustment Using a VF Checker

### 2-2-1. Notes on Adjustment

1. When performing adjustment, read throughly the following comments.
  - The calibration of all measuring equipment should be completed.
  - "2-2-4. Settings for adjustment" should be completed.

#### WARNING

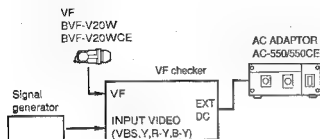
There is a danger of an electric shock around the CRT due to high voltage. Therefore, do not touch the CRT.  
Be very careful when service in a live.

### 2-2-2. Equipment/Fixtures

- Composite signal generator  
Shibasoku TG21AX or equivalent
- Monoscope signal generator  
Shibasoku TG21A1001 or equivalent [For NTSC]  
Shibasoku TG21A2001 or equivalent [For PAL]
- AC adapter  
Sony AC-550/550CE or equivalent
- Oscilloscope  
Tektronix 2465B or equivalent
- Waveform monitor  
Tektronix 1750/1751 or equivalent
- Frequency counter  
Advantest TR5821AK or equivalent

Fixtures	Sony P/N
VF checker	J-6422-300-A
VF extension harness	J-6395-050-A

### 2-2-3. Connections



### 2-2-4. Settings for Adjustment

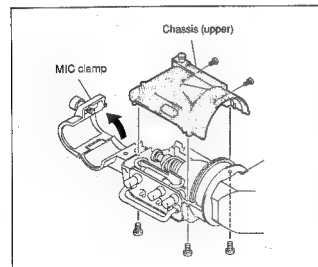
Set switches as follows before adjustment.

VF checker:

- INPUT VIDEO VBS switch → SG
- INPUT VIDEO Y/R-Y/B-Y switch → SG
- EIA/CCIR switch → EIA [For NTSC]
- EIA/CCIR switch → CCIR [For PAL]
- 16 : 9/4 : 3 switch → 4 : 3
- COMP/VBS switch → VBS

### 2-2-5. Extending Viewfinder

1. Remove the chassis (upper).



2. Connect the viewfinder to the VF checker using the VF extension harness (J-6395-050-A).

### 2-2-6. Vertical Hold Adjustment

#### Preparation

- Disconnect the cable from the VBS connector on the VF checker.

#### Adjustment Procedure

1. Equipment : Frequency counter  
 Test point : CP3/VF-67  
 GND : E1/VF-67  
 Adjustment point : RV9 (V-HOLD) /VF-67  
 Specification :  $48.0 \pm 0.5$  Hz (For NTSC)  
 $38.0 \pm 0.5$  Hz (For PAL)

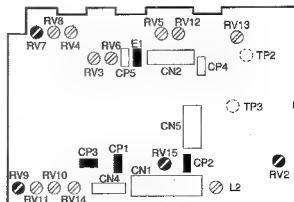
### 2-2-7. Horizontal Hold Adjustment

#### Preparation

- Disconnect the cable from the VBS connector on the VF checker.

#### Adjustment Procedure

1. Equipment : Frequency counter  
 Test point : CP1/VF-67  
 GND : E1/VF-67  
 Adjustment point : RV7 (H-HOLD) /VF-67  
 Specification :  $15.73 \pm 0.05$  kHz (For NTSC)  
 $15.63 \pm 0.05$  kHz (For PAL)



VF-67 BOARD (A SIDE)

## 2-2-8. Sub Contrast Adjustment

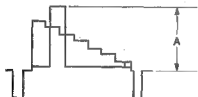
### Preparation

- Input the color bars signal to the VBS connector on the VF checker.
- CONTRAST control → Fully clockwise

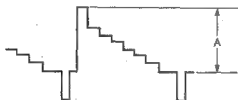
### Adjustment Procedure

1. Equipment : Oscilloscope  
Test point : CP2/VF-67  
GND : E1/VF-67  
Adjustment point : RV15 (SUB CONTRAST) / VF-67  
Specification :  $A=10.0 \pm 0.1$  V p-p (without sync)

#### For NTSC model



#### For PAL model



## 2-2-9. Bright Set Adjustment

### Preparation

- 16:9/4:3 switch (VF checker) → 4:3
- Input the color bars signal to the VBS connector on the VF checker.
- BRIGHT control → Mechanical center
- CONTRAST control → Mechanical center

### Adjustment Procedure

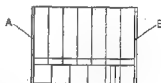
1. Adjustment point : RV2 (SUB BRIGHT) / VF-67  
Specification : Refer to lower figure
2. 16:9/4:3 switch (VF checker) → 16:9
3. Adjustment point : RV4 (SUB BRIGHT WIDE) / VR-226  
Specification : Refer to lower figure

#### For NTSC model

##### Adjustment method

: Adjust RV2 (RV4) so that the black of portions A (front-porch) or B (back-porch) on the viewfinder screen can be barely discriminated black.

Portions A, B and the blanking of A or B's side cannot be discriminated.



#### For PAL model

##### Adjustment method

: Adjust RV2 (RV4) so that the black of portions A (front-porch) or B (back-porch) on the viewfinder screen can be barely discriminated black.

Portions A, B and the blanking of A or B's side cannot be discriminated.



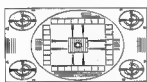
## 2-2-10. Focus Adjustment

### Note

This adjustment, "2-2-11. Heater Voltage Adjustment" and "2-2-12. Picture Frame Adjustment" affect each other. Therefore, repeat these adjustments until these specifications are satisfied.

### Preparation

- 16:9/4:3 switch (VF checker) → 16:9
- Input the monoscope (4:3) signal to the VBS connector on the VF checker.

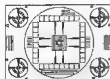


(Viewfinder screen)

- BRIGHT control → Mechanical center
- CONTRAST control → Mechanical center

### Adjustment Procedure

1. Adjustment point :  $\odot$ RV5 (FOCUS SET) /VF-67  
Adjustment method : Turn  $\odot$ RV5 fully counterclockwise, and slowly turn it clockwise to adjust the best focus position.
2. Confirm that the best focus can be obtained irrespective of its BRIGHT and CONTRAST controls setting.
3. 16:9/4:3 switch (VF checker) → 4:3



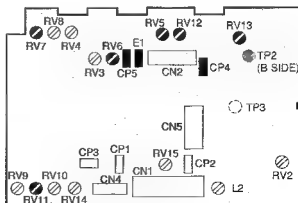
(Viewfinder screen)

- BRIGHT control → Mechanical center
- CONTRAST control → Mechanical center
- Confirm that the best focus can be obtained.

4. Equipment : Digital voltmeter  
Test point : TP2/VF-67 (B SIDE)  
GND : E1/VF-67  
Adjustment point :  $\odot$ RV12 (OPAMP-ADJ) /VF-67  
Specification :  $6.0 \pm 0.2$  V dc

### Note

After adjustments are completed, confirm that the best focus can be obtained irrespective of its BRIGHT and CONTRAST controls setting.



VF-67 BOARD (A SIDE)

## 2-2-11. Heater Voltage Adjustment

### Note

This adjustment, "2-2-10. Focus Adjustment" and "2-2-12. Picture Frame Adjustment" affect each other. Therefore, repeat these adjustments until these specifications are satisfied.

### Preparation

- 16:9/4:3 switch (VF checker) → 4:3
- BRIGHT control → Mechanical center
- CONTRAST control → Mechanical center
- PEAKING control → Mechanical center
- Input the monoscope (4:3) signal to the VBS connector on the VF checker.
- Setting of the signal generator (TG21A1001)  
LUMINANCE → OFF  
CHROMINANCE → OFF  
(Or input the black burst signal using another signal generator.)

### Adjustment Procedure

1. Equipment : Digital voltmeter  
Test point : CP4 (H1)/VF-67  
CP5 (H2)/VF-67  
Adjustment point : ⚙RV6 (HEATER)/VF-67  
Specification :  $635 \pm 15$  mV dc
2. Confirm that the specification is met and horizontal noise irrespective of its BRIGHT, CONTRAST and PEAKING controls setting.
3. 16:9/4:3 switch (VF checker) → 16:9
4. Confirm that the specification is met and horizontal noise irrespective of its BRIGHT, CONTRAST and PEAKING controls setting.

### Setting after Adjustment

TG21A1001

LUMINANCE → ON  
CHROMINANCE → ON

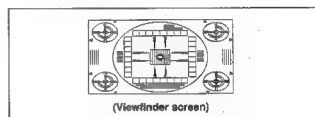
## 2-2-12. Picture Frame Adjustment

### Note

This adjustment, "2-2-10. Focus Adjustment" and "2-2-11. Heater Voltage Adjustment" affect each other. Therefore, repeat these adjustments until these specifications are satisfied.

### Preparation

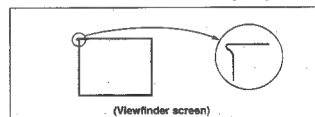
- 16:9/4:3 switch (VF checker) → 16:9
- Input the monoscope (4:3) signal to the VBS connector on the VF checker.



- BRIGHT control → Mechanical center
- CONTRAST control → Mechanical center

### Adjustment Procedure

1. Adjustment point : ⚙RV7 (H-HOLD)/VF-67  
Specification : If the upper left corner of the picture is distorted, makes right angle.



2. Adjustment point : ⚙RV11 (V-LIN)/VF-67  
⚙RV13 (H-LIN)/VF-67  
Specification : Minimize the distortion of the four circles at the corners of the resolution chart.

(To be continued)

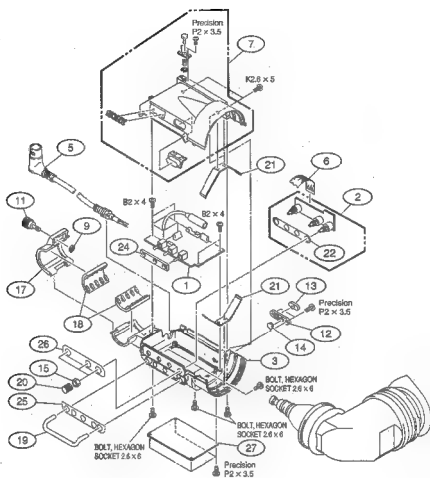




## Section 3

### Spare Parts

#### 3-1. Exploded Views



No. Part No. SP Description

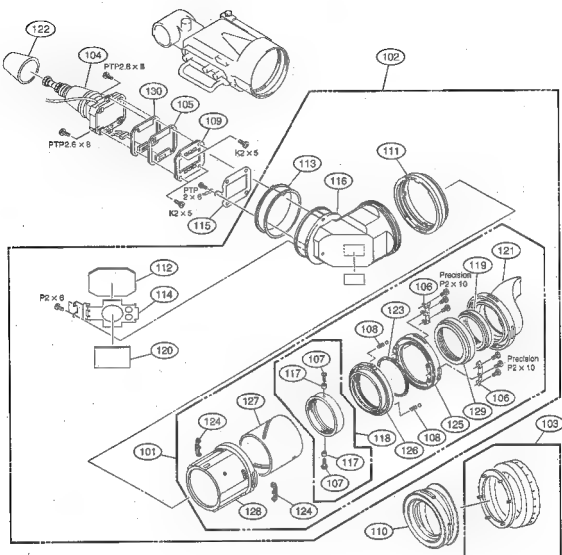
1	1-761-129-11	o MOUNTED CIRCUIT BOARD, VF-67
2	1-761-130-11	o MOUNTED CIRCUIT BOARD, VR-226
3	X-3678-575-3	o CRASSIS B ASSY, BOTTOM (LOWER)
4	1-823-972-12	s CORD, CONNECTION (VF)
5	1-777-252-11	o CABLE, FLAT (14 CORE)
7	A-8277-112-2	o CASE ASSY, TOP
9	3-165-904-01	s WASHER, SCREW STOPPER
11	3-657-657-00	s SCREW (M5)
12	3-679-693-01	o BASE, SLIDE
13	3-679-694-01	o COVER, SLIDE
14	3-679-695-01	o COVER, TALLY
15	3-685-104-01	s NUT (M6), CONTROL
17	3-692-134-01	o MIC CLAMP
18	3-692-138-01	o MIC CUSHION, RUBBER

No. Part No. SP Description

19	3-692-147-01	o GUARD BAR
20	3-692-154-03	s KNOB, VF
21	3-697-152-01	o SPRING, LEAF (2)
22	3-697-153-01	o PLATE, GROUND (2)
24	3-697-156-01	o CUSHION, DROP PROTECTION (2)
25	3-697-157-01	o LABEL, VF (B)
26	3-697-160-01	o LABEL, VF (C)
27	3-697-161-01	o LID, COVER
	7-621-772-18	s SCREW, +B ZK4
	7-627-454-38	s SCREW, PRECISION +K 2.5X5
	7-627-554-18	s SCREW, PRECISION +P 2X3.5 TYP51
	7-683-412-05	s BOLT, HEXAGON SOCKET 2.6X6

No. 4, 8, 10, 15, 23, 28 and 29 are omitted.

# Viewfinder



No.	Part No.	SP Description
101	A-8262-798-A	s TUBE SUB ASSY, VF
102	A-8277-114-3	s TUBE ASSY, VF
103	X-3678-187-1	s CUSHION, EYE CUP ASSY
104	1-251-439-11	s CRT/OY ASSY, 2" WIDE
105	1-761-131-11	s MOUNTED CIRCUIT BOARD, 1P-105
106	3-176-414-01	o RETAINER, RING
107	3-335-207-01	s SHAFT, MOTOR
108	3-573-150-00	o SPRING, COMPRESSION
109	3-682-882-01	o SPACER, MASK
110	3-682-494-02	o EYE, CUP (S)
111	3-692-136-02	o FIXED RING
112	3-692-139-01	o MIRROR (2)
113	3-697-151-01	o RING, VF
114	3-697-154-01	o HOLDER, MIRROR (3)
115	3-697-159-01	o PLATE A, DISPLAY
116	3-697-167-02	o VF TUBE (4)
117	3-722-485-01	o ROLLER, SLIDE
118	X-3608-271-3	s ASSY, VF LENS
119	3-723-069-02	o PROTECTOR, MC
120	3-723-073-01	o CUSHION, MIRROR

No.	Part No.	SP Description
121	3-723-079-02	s EYE CUP
122	3-725-220-02	o TUBE (A), CRT
123	3-726-904-01	o RING (MT), O
124	3-742-038-01	o NUT (2), PLATE
125	3-742-052-03	o HOLDER, EYE CUP
126	3-742-053-02	o RING
127	3-742-054-01	o TUBE
128	3-742-060-01	o HOLDER, RING
129	3-742-075-01	o HOLDER, FILTER
130	9-882-884-01	o INSULATOR
	7-624-200-01	s NUT, PUSH 1.5
	7-624-107-04	s SYNC RING 1.5, TYPE-E
	7-627-452-38	s SCREW, PRECISION #X 2X5
	7-627-533-78	s SCREW, PRECISION #P 2X10
	7-671-158-01	o BALL, STAINLESS (2.5 DIA)
	7-685-104-19	s SCREW #PTP 2X6 TYPE2 NON-SLIT
	7-685-134-19	s SCREW #PTP 2.6X8 TYPE2 NON-SLIT

## 3-2. Electrical Parts List

### LP-105 BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	1-761-131-11	o MOUNTED CIRCUIT BOARD, LP-105
CN21	1-565-551-11	o CONNECTOR 8P, MALE
D1	8-719-026-39	s LED CL-150UR-CD, RED
D2	8-719-026-39	s LED CL-150UR-CD, RED
D3	8-719-026-39	s LED CL-150PG-CD, GRN
D4	8-719-026-16	s LED CL-150D-CD, ORG
D5	8-719-026-39	s LED CL-150UR-CD, RED
D6	8-719-026-16	s LED CL-150D-CD, ORG

### VF-67 BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	1-761-129-11	m MOUNTED CIRCUIT BOARD, VF-67(UCJ)
1pc	1-761-129-21	o MOUNTED CIRCUIT BOARD, VF-67(CS)
C1	1-163-037-11	s CERAMIC, CHIP 0.022uF 10% 25V
C2	1-163-021-11	s CERAMIC, CHIP 0.01uF 10% 50V
C3	1-163-021-11	s CERAMIC, CHIP 0.01uF 10% 50V
C4	1-163-021-11	s CERAMIC, CHIP 0.01uF 10% 50V
C5	1-113-662-11	s TANTALUM 33uF 20% 10V
C6	1-113-985-11	s TANTALUM 10uF 20% 20V
C8	1-163-249-11	s CERAMIC, CHIP 82PF 5% 50V
C9	1-135-214-21	s TANTALUM 4.7uF 10% 20V
C10	1-113-985-11	s TANTALUM 10uF 10% 20V
C11	1-163-021-11	s CERAMIC, CHIP 0.01uF 10% 50V
C12	1-163-021-11	s CERAMIC, CHIP 0.01uF 10% 50V
C13	1-125-988-21	s TANTALUM 330uF 20% 25V
C14	1-163-038-11	s CERAMIC 0.1uF 25V
C15	1-137-689-11	s TANTALUM 47uF 16V
C17	1-163-259-11	s CERAMIC, CHIP 220PF 5% 50V
C18	1-163-021-11	s CERAMIC, CHIP 220PF 5% 50V
C19	1-163-243-11	s CERAMIC, CHIP 47PF 5% 50V
C20	1-163-038-11	s CERAMIC 0.1uF 25V
C21	1-163-038-11	s CERAMIC 0.1uF 25V
C25	1-137-150-11	s FILM 0.01uF 5% 100V
C26	1-163-809-11	s CERAMIC 0.047uF 10% 50V
C27	1-135-214-21	s TANTALUM 4.7uF 10% 20V
C28	1-107-425-11	s CERAMIC 470PF 10% 1KV
C29	1-115-339-11	s CERAMIC 0.1uF 10% 50V
C30	1-124-773-11	s ELECT 27uF 20% 63V
C31	1-113-981-11	s TANTALUM 22uF 20V
C32	1-136-289-11	s FILM 0.0056uF 5% 100V
C33	1-113-985-11	s TANTALUM 0.0056uF 5% 100V
C35	1-107-689-21	s TANTALUM, CHIP 1uF 10% 35V
C36	1-113-985-11	s TANTALUM 10uF 20% 20V
C37	1-113-985-11	s TANTALUM 10uF 20% 20V
C38	1-113-985-11	s TANTALUM 10uF 20% 20V
C39	1-163-038-11	s CERAMIC 0.1uF 25V
C40	1-163-038-11	s CERAMIC 0.1uF 25V
C41	1-113-985-11	s TANTALUM 10uF 20% 20V
C42	1-113-985-11	s TANTALUM 10uF 20% 20V
C43	1-107-689-21	s TANTALUM, CHIP 1uF 10% 35V
C44	1-163-019-11	s CERAMIC, CHIP 0.0068uF 10% 50V
C45	1-113-985-11	s TANTALUM 10uF 20% 20V
C46	1-104-547-11	s FILM 0.0047uF 5% 16V
C47	1-163-037-11	s CERAMIC, CHIP 0.022uF 10% 25V
C48	1-163-038-11	s CERAMIC 0.1uF 25V
C49	1-163-038-11	s CERAMIC 0.1uF 25V
C50	1-107-689-21	s TANTALUM, CHIP 1uF 10% 35V
C51	1-107-689-21	s TANTALUM, CHIP 1uF 10% 35V
C53	1-163-037-20	s CERAMIC, CHIP 0.0047uF 5% 50V
C54	1-128-397-21	s ELECT 100uF 20% 16V
C55	1-163-259-11	s CERAMIC, CHIP 220PF 5% 50V
C56	1-113-985-11	s TANTALUM 10uF 20% 20V
C57	1-107-687-11	s TANTALUM 3.3uF 20% 20V
C58	1-163-038-11	s CERAMIC 0.1uF 25V
C59	1-163-019-11	s CERAMIC, CHIP 0.0056uF 10% 50V
C60	1-107-778-11	s ELECT 470uF 20% 16V
C61	1-163-023-11	s CERAMIC 0.015uF 10% 50V

## (VF-67 BOARD)

Ref. No. or Q'ty	Part No.	SP Description
C70	1-164-366-11	CERAMIC, CHIP 1uF 16V
C71	9-882-887-01	FILM 2400PF
C72	1-115-339-91	CERAMIC, CHIP 0.1uF
CN1	1-560-538-11	CONNECTOR, LX18P, MALE
CN2	1-764-080-21	CONNECTOR (PC BOARD) 8P, FEMALE
CN3	1-569-529-11	HOUSING, 14P
CN4	1-564-004-11	CONNECTOR 5P, MALE
CN5	1-564-004-31	CONNECTOR 5P, MALE
D1	8-719-941-86	DIODE DAN202C
D2	8-719-941-86	DIODE DAN202C
D3	8-719-029-68	DIODE R06 200V-T1
D4	8-719-820-42	DIODE 1S8302
D5	8-719-941-86	DIODE DAN202C
D6	8-719-976-56	DIODE RLS245
D7	8-719-976-56	DIODE RLS245
D8	8-719-941-86	DIODE DAN202C
D9	8-719-070-38	DIODE ESJA57-04A
D10	8-719-941-86	DIODE DAN202C
D11	8-719-941-86	DIODE DAN202C
D12	8-719-820-42	DIODE 1S8302
D13	8-719-976-56	DIODE RLS245
D14	9-904-843-01	DIODE HXNCLTR
DL1	1-411-383-11	DELAY LINE 80ns
FBT1	Δ 1-429-619-11	TRANSFORMER FLYBACK
HLC1	Δ 9-882-891-01	COIL, HORIZONTAL LINEARITY
IC2	8-759-209-56	IC TC4051P
IC3	8-759-242-64	IC TC4053P
IC4	8-759-144-72	IC UPC358C2-E2
IC5	8-759-209-57	IC TC4069P
IC7	8-759-394-26	IC LM4041EM3-1.2
IC8	Δ 8-759-300-28	IC HA11423MP
IC9	8-759-209-57	IC TC4069P
L1	1-410-380-31	INDUCTOR, CHIP 8.2uH
L2	Δ 9-882-890-01	COIL
LED1	8-719-989-53	LED CL-200HR-C-TSL, RED
Q1	8-729-028-91	TRANSISTOR D7A144EUA-T106
Q2	8-729-028-91	TRANSISTOR D7A144EUA-T106
Q3	8-729-905-38	TRANSISTOR 2SC4081T106R
Q4	8-729-905-27	TRANSISTOR 2SA1576-R
Q5	8-729-403-30	TRANSISTOR XN6435
Q6	8-729-024-57	TRANSISTOR 2SA1808-P
Q7	8-729-118-62	TRANSISTOR 2SK852
Q8	8-729-403-33	TRANSISTOR XN6534
Q9	8-729-038-81	TRANSISTOR 2SC4102T106
Q10	8-729-038-81	TRANSISTOR 2SC4102T106
Q11	8-729-038-81	TRANSISTOR 2SC4102T106
Q12	8-729-927-90	TRANSISTOR 2SA1579-RS
Q15	8-729-729-81	TRANSISTOR 2SB1132-GR
Q17	8-729-042-51	TRANSISTOR 2N1234L
Q18	8-729-042-51	TRANSISTOR 2SK1254L
Q19	8-729-905-38	TRANSISTOR 2SC4081T106R
Q20	8-729-905-27	TRANSISTOR 2SA1576-R
Q21	8-729-905-38	TRANSISTOR 2SC4081T106R
Q22	8-729-905-38	TRANSISTOR 2SC4081T106R
Q23	8-729-905-27	TRANSISTOR 2SA1576-R

## (VF-67 BOARD)

Ref. No. or Q'ty	Part No.	SP Description
Q24	8-729-042-51	TRANSISTOR 2SK1254L
Q25	8-729-042-51	TRANSISTOR 2SK1254L
R1	1-218-707-11	METAL, CHIP 4.3K 0.50% 1/10W
R2	1-216-815-11	METAL, CHIP 330 5% 1/10W
R3	1-216-071-00	METAL 8.2K 5% 1/10W
R4	1-216-101-00	METAL 150K 5% 1/10W
R5	1-216-049-11	METAL 1K 5% 1/10W
■	1-216-053-00	METAL 1.5K 5% 1/10W
R6	1-216-295-00	CONDUCTOR, CHIP 0
■	Δ 1-216-825-11	METAL 2.2K 5% 1/10W
R10	1-216-089-00	METAL 47K 5% 1/10W
R11	Δ 1-216-057-00	METAL 2.2K 5% 1/10W
R12	Δ 1-216-825-11	METAL 2.2K 5% 1/10W
R13	Δ 1-216-825-11	METAL 2.2K 5% 1/10W
R15	1-216-309-00	METAL, CHIP 5.6 5% 1/10W
R16	1-216-009-00	METAL 22 5% 1/10W
R17	1-216-073-00	METAL 10K 5% 1/10W
R18	1-216-081-00	METAL 22K 5% 1/10W
R19	1-216-071-00	METAL 8.2K 5% 1/10W
R20	1-216-041-11	METAL 470 5% 1/10W
R21	1-216-041-11	METAL 470 5% 1/10W
R22	1-216-065-00	METAL, CHIP 4.7K 5% 1/10W
R23	1-216-079-00	METAL 18K 5% 1/10W
R24	1-216-041-11	METAL 470 5% 1/10W
R25	1-216-033-00	METAL 220 5% 1/10W
R26	1-216-033-00	METAL 220 5% 1/10W
R27	1-216-993-11	METAL 2.4K 5% 1/10W
R28	1-216-065-00	METAL, CHIP 4.7K 5% 1/10W
R29	1-216-827-11	METAL, CHIP 3.3K 5% 1/10W
R30	1-216-073-00	METAL 10K 5% 1/10W
R31	1-216-031-00	METAL 180 5% 1/10W
R32	1-216-815-11	METAL, CHIP 330 5% 1/10W
R33	1-216-829-11	METAL, CHIP 4.7K 5% 1/10W
R34	1-216-037-00	METAL, CHIP 330 5% 1/10W
R35	1-216-017-00	METAL 47 5% 1/10W
R36	1-216-067-00	METAL 5.6K 5% 1/10W
R37	1-216-824-11	METAL, CHIP 1.8K 5% 1/10W
R38	1-216-833-11	METAL 10K 5% 1/10W
R39	1-216-837-11	METAL 22K 5% 1/10W
R40	1-216-025-00	METAL 100 5% 1/10W
R41	1-216-069-30	METAL, CHIP 6.8K 5% 1/10W
R42	1-216-073-00	METAL 10K 5% 1/10W
R43	1-216-133-00	METAL, CHIP 3.3K 5% 1/10W
R44	1-216-133-00	METAL, CHIP 3.3K 5% 1/10W
R45	1-216-133-00	METAL, CHIP 3.3K 5% 1/10W
R46	Δ 1-216-057-00	METAL 2.2K 5% 1/10W
R47	1-216-091-00	METAL 56K 5% 1/10W
R48	1-216-089-00	METAL 47K 5% 1/10W
R49	Δ 1-216-085-00	METAL 33K 5% 1/10W
R54	1-216-864-11	CONDUCTOR, CHIP 0
R55	Δ 1-216-085-00	METAL 33K 5% 1/10W
R56	1-216-829-11	METAL, CHIP 4.7K 0.50% 1/10W
R58	1-216-085-00	METAL 33K 5% 1/10W
R59	1-216-836-11	METAL 18K 5% 1/10W
R60	1-216-081-00	METAL 22K 5% 1/10W
R61	1-216-079-00	METAL 18K 5% 1/10W
R62	1-216-061-00	METAL, CHIP 3.3K 5% 1/10W
R63	1-216-081-00	METAL 22K 5% 1/10W
R64	1-216-081-00	METAL 22K 5% 1/10W
R65	Δ 1-216-833-11	METAL 10K 5% 1/10W

## (VF-67 BOARD)

Ref. No. or Q'ty	Part No.	SP Description
R57	1-216-097-00	METAL 100K 5% 1/10W
R58	1-216-067-00	METAL 5.6K 5% 1/10W
R59	1-216-065-00	METAL 4.7K 5% 1/10W
R70	1-216-073-00	METAL 10K 5% 1/10W
R71	1-216-121-00	METAL, CHIP 1M 5% 1/10W
R73	1-216-049-11	METAL 1K 5% 1/10W
R74	1-216-025-00	METAL, CHIP 100 5% 1/10W
R75	1-216-133-00	METAL, CHIP 3.3M 5% 1/10W
R76	1-216-133-00	METAL, CHIP 3.3M 5% 1/10W
R77	1-216-133-00	METAL, CHIP 3.3M 5% 1/10W
R78	1-216-097-00	METAL 100K 5% 1/10W
R79	1-216-864-11	CONDUCTOR, CHIP 0
R80	1-216-033-00	METAL, CHIP 220 5% 1/10W
R81	1-216-049-11	METAL, CHIP 1K 5% 1/10W
R82	1-216-309-00	METAL, CHIP 5.5 5% 1/10W
R83	1-216-807-11	METAL, CHIP 68 5% 1/10W
R85	1-216-113-00	METAL, CHIP 470K 5% 1/10W
R86	1-216-821-11	METAL 1K 5% 1/10W
R87	1-216-075-00	METAL 12K 5% 1/10W
R88	1-216-083-00	METAL 27K 5% 1/10W
R89	1-216-073-00	METAL 10K 5% 1/10W
R90	1-216-071-00	METAL 8.2K 5% 1/10W
R91	1-216-025-00	METAL 100 5% 1/10W
R92	1-216-081-00	METAL 22K 5% 1/10W
R93	1-216-027-00	METAL 120 5% 1/10W
R94	1-216-833-11	METAL 10K 5% 1/10W
R95	1-216-843-11	METAL 68K 5% 1/10W
R96	1-216-845-11	METAL 100K 5% 1/10W
R97	1-202-830-11	METAL, CHIP 750K 5% 1/10W
R98	1-216-834-11	METAL 12K 5% 1/10W
R99	1-216-832-11	METAL 0.2K 5% 1/10W
R100	1-216-839-11	METAL 33K 5% 1/10W
R101	1-216-057-00	METAL 2.2K 5% 1/10W
R102	1-216-851-11	METAL 330K 5% 1/10W
R103	1-216-840-11	METAL 39K 5% 1/10W
R104	1-216-830-11	METAL 5.6K 5% 1/10W
R105	1-216-833-11	METAL 10K 5% 1/10W
R106	1-216-831-11	METAL 6.8K 0.5% 1/10W
R108	1-216-821-11	METAL 1K 5% 1/10W
R109	1-216-864-11	CONDUCTOR, CHIP 0
R110	1-216-005-00	METAL, CHIP 15 5% 1/10W
R111	1-216-061-00	METAL, CHIP 3.3K 5% 1/10W
R112	1-216-065-00	METAL, CHIP 4.7K 5% 1/10W
R113	1-216-308-00	METAL, CHIP 4.7 5% 1/10W
R114	1-216-839-11	METAL 33K 5% 1/10W
R115	1-216-841-11	METAL 47K 5% 1/10W
R116	1-216-845-11	METAL 100K 5% 1/10W
R117	1-216-043-00	METAL, CHIP 560 5% 1/10W
R118	1-216-041-11	METAL 470 5% 1/10W
R119	1-216-001-00	METAL, CHIP 10 5% 1/10W
R128	9-882-888-01	CONDUCTOR, CHIP 0
R130	1-216-864-11	CONDUCTOR, CHIP 0
RV2	1-241-741-11	RES, ADJ CERMET 50K
RV3	1-241-832-11	RES, ADJ CERMET 5K
RV4	1-241-832-11	RES, ADJ CERMET 5K
RV5	1-241-833-11	RES, ADJ CERMET 10K
RV6	1-241-826-11	RES, ADJ CERMET 100
RV7	1-241-832-11	RES, ADJ CERMET 5K
RV8	1-241-838-11	RES, ADJ CERMET 500K
RV9	1-241-832-11	RES, ADJ CERMET 5K

## (VF-67 BOARD)

Ref. No. or Q'ty	Part No.	SP Description
RV10	1-241-828-11	RES, ADJ CERMET 500
RV11	1-241-828-11	RES, ADJ CERMET 500
RV12	1-241-832-11	RES, ADJ CERMET 5K
RV13	1-241-826-11	RES, ADJ CERMET 100
RV15	1-241-827-11	RES, ADJ CERMET 200
S1	1-762-488-11	SWITCH, TOGGLE
S2	1-762-320-11	SWITCH, TOGGLE
S3	1-762-489-11	SWITCH, TOGGLE

# VR-226 BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	1-761-130-11	o MOUNTED CIRCUIT BOARD, VR-226
1pc	3-697-153-01	o PLATE, GROUND(2)
C1	1-113-981-11	s TANTALUM 22uF 20V
C2	1-163-021-91	s CERAMIC, CHIP 0.01uF 10% 50V
C3	1-163-021-91	s CERAMIC, CHIP 0.01uF 10% 50V
C4	1-163-037-91	s CERAMIC, CHIP 0.022uF 10% 25V
C5	1-131-861-91	s TANTALUM 4.7uF 20% 20V
C6	1-104-917-91	s TANTALUM 15uF 20% 20V
C7	1-163-036-91	s CERAMIC 0.1uF 25V
C8	1-163-021-91	s CERAMIC, CHIP 0.01uF 10% 50V
CN11	1-569-529-11	o HOUSING, 14P
D1	8-719-053-96	s LED CL-200SR-C-TSL, RED
D2	8-719-053-96	s LED CL-200SR-C-TSL, RED
IC1	8-759-939-53	s IC 3A225P-T2
Q1	8-729-028-91	s TRANSISTOR DTA144EUA-T106
Q2	8-729-028-91	s TRANSISTOR DTA144EUA-T106
Q3	8-729-402-21	s TRANSISTOR 2N6502
Q4	8-729-402-21	s TRANSISTOR 2N6501
Q5	8-729-422-10	s TRANSISTOR 2S3664
R1	1-216-615-11	s METAL, CHIP 33 0.5% 1/10W
R2	1-216-645-11	s METAL, CHIP 560 0.5% 1/10W
R3	1-216-673-11	s METAL, CHIP 8.2K 0.5% 1/10W
R4	1-216-683-11	s METAL 22K 0.5% 1/10W
R5	1-216-683-11	s METAL 22K 0.5% 1/10W
R6	1-216-683-11	s METAL 22K 0.5% 1/10W
R7	1-216-772-11	s METAL 680K 0.5% 1/10W
R8	1-216-691-11	s METAL 47K 0.5% 1/10W
R9	1-216-693-11	s METAL 56K 0.5% 1/10W
R10	1-216-285-91	s RES, CHIP 0
R11	1-216-691-11	s METAL 47K 0.5% 1/10W
R13	1-216-683-11	s METAL 22K 0.5% 1/10W
R14	1-216-643-11	s METAL 470 0.5% 1/10W
R15	1-216-693-11	s METAL 56K 0.5% 1/10W
R16	1-216-635-11	s METAL, CHIP 220 0.5% 1/10W
RV1	1-238-293-11	s RES, VAR CARBON 10K
RV2	1-238-290-11	s RES, VAR CARBON 1K
RV4	1-241-269-41	s RES, ADJ CERMET 560K
RV5	1-238-296-11	s RES, VAR CARBON 10K

# FRAME

Ref. No. or Q'ty	Part No.	SP Description
1pc	Δ 1-251-439-11	s CRT/DY ASSY, 2" WIDE
1pc	1-777-028-21	s CORD, CONNECTION (VF)
1pc	1-777-252-11	o CABLE, FLAT (14 CORE)

# HARNESS (LP)

(CN2/VF-67 board to C R2 1/LP-101 board)		
CN2	1-764-196-11	o HOUSING, 8P
8pcs	1-695-215-11	o CONTACT, 1P AWS26-30
CN21	1-565-852-11	o HOUSING, 8P
8pcs	1-563-940-11	o CONTACT, AWS26-30

## 3-3. Supplied Accessories

Ref. No. or Q'ty	Part No.	SP Description
1pc	1-542-296-11	o MICROPHONE
1pc	3-179-882-01	o SPACER, MICROPHONE
1pc	3-709-096-01	s SCREEN, WINDOW

## Section 4

### Semiconductor Pin Assignments

ここに記載されている半導体は、それぞれの機能を等価的に表したものです。なお、互換性のない型名を併記していることがありますので、部品を交換するときは、Spare Partsの章を参照してください。  
等価回路はICメーカーのデータブックに従いました。

Semiconductors of which functions are equivalent are described here. For parts replacement, refer to the section of Spare Parts in this manual. The circuit diagram of each IC is obtained from the IC data book published by the manufacturer.

DIODE	Page	TRANSISTOR	Page	IC	Page
1SS302 .....	4-2	2SA1576-R .....	4-2	BA10358F-E2 .....	4-3
		2SA1808-P .....	4-2	BA225F-T2 .....	4-3
CL-150D-CD .....	4-2	2SA1808-PT106 .....	4-2		
CL-150PG-CD .....	4-2	2SB1132-P .....	4-2	HA11423MP .....	4-3
CL-150UR-CD .....	4-2	2SC3360-N16 .....	4-2		
CL-150UR-CD-T .....	4-2	2SC4081T106R .....	4-2	LM334MX .....	4-3
CL-200HR-C-TSL .....	4-2	2SK1113 .....	4-2	LM4041EIM3-1.2 .....	4-3
		2SK663 .....	4-2		
DAN202U .....	4-2	2SK664 .....	4-2	TC4S01F .....	4-3
				TC4S69F .....	4-3
RD6.2UJN-T1 .....	4-2	DTA144EUA-T106 .....	4-2	TC4W53F .....	4-3
V09C .....	4-2	XN6435 .....	4-2		
V09G .....	4-2	XN6501 .....	4-2		
V11N .....	4-2	XN6534 .....	4-2		

# Diode, Transistor

## DIODE

TOP VIEW



1SS302  
1SS302-TE85L



CL-150D-CD;ORANGE  
CL-150PG-CD;GREEN  
CL-150UR-CD;RED  
CL-150UR-CD-T;RED  
CL-150D-CD-T  
CL-150PG-CD-T



CL-200HR-C-TSL;RED

TOP VIEW



DAN202U  
DAN202UT106

TOP VIEW



RD8.2UJN-T1



V09C  
V09G  
V11N

## TRANSISTOR

TOP VIEW



2SA1576-R  
2SA1808-P  
2SA1808-PT106  
2SA1576T106R

TOP VIEW



2SB1132-P  
2SB1132-T100-QR

TOP VIEW



2SC3360-N16  
2SC4061T106R  
2SC3360-T1N17



2SK1113

TOP VIEW



2SK663  
2SK652-T1X3

TOP VIEW



2SK664  
2SK664-TX

TOP VIEW



DTA144EUA-T106

TOP VIEW



XN6436  
XN6435-TW



TOP VIEW



XN6501(MATSUSHITA)  
XN6534  
XN6501-TW  
XN6534-TW

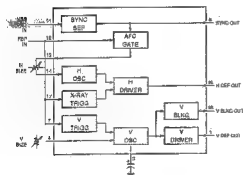
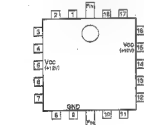
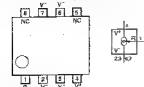




IC

**BA10358F-E2(NS)**  
**UPC358G2-E2**
**DUAL OPERATIONAL AMPLIFIERS**  
 —TOP VIEW—

**BA225F-72(ROHM)FLAT PACKAGE**
**CR TIMER**  
 —TOP VIEW—

**HA11423MP(HITACHI)FLAT PACKAGE**
**TV HV SYNC SIGNAL PROCESSOR**  
 —TOP VIEW—

**LM334M(X)(NS)FLAT PACKAGE**
**ADJUSTABLE CURRENT SOURCE**  
 —TOP VIEW—

**LM0041EIM3-1.2(NS)**
**SHUNT VOLTAGE REFERENCE**

—TOP VIEW—



Reference breakdown voltage = 1.25V.

**TC4S01F(TOSHIBA)CHIP PACKAGE**  
**TC4S01F(TE88R)**
**C-MOS 2-INPUT NOR GATE**

(SCALE 5/1)

—TOP VIEW—



TYPE	VDD
4S01F	+3 to +5V
4S01F	+3 to +5V
4S01F	+3 to +5V
4S01F	+3 to +5V

**TC4S09F(TOSHIBA)CHIP PACKAGE**  
**TC4S09F(TE88R)**
**C-MOS INVERTER**

(SCALE 5/1)

—TOP VIEW—



TYPE	VDD
7S09F	+3 to +5V
7S09F	+3 to +5V
7S09F	+3 to +5V
7S09F	+3 to +5V

**TC4W53F(TOSHIBA)CHIP PACKAGE(5.0 X 3.1)**
**C-MOS 2-CHANNEL MULTIPLEXER / DEMULTIPLEXER**

(SCALE 5/1)

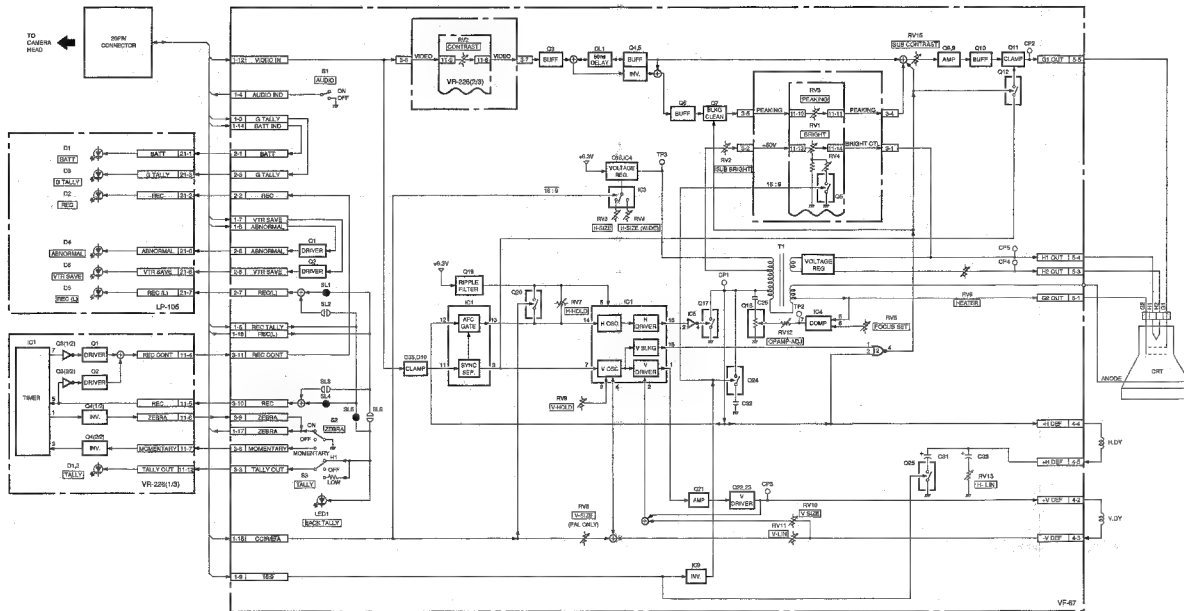
—TOP VIEW—



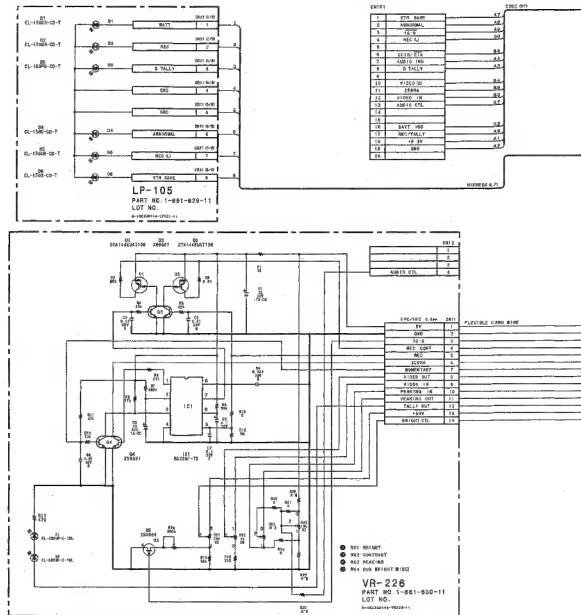
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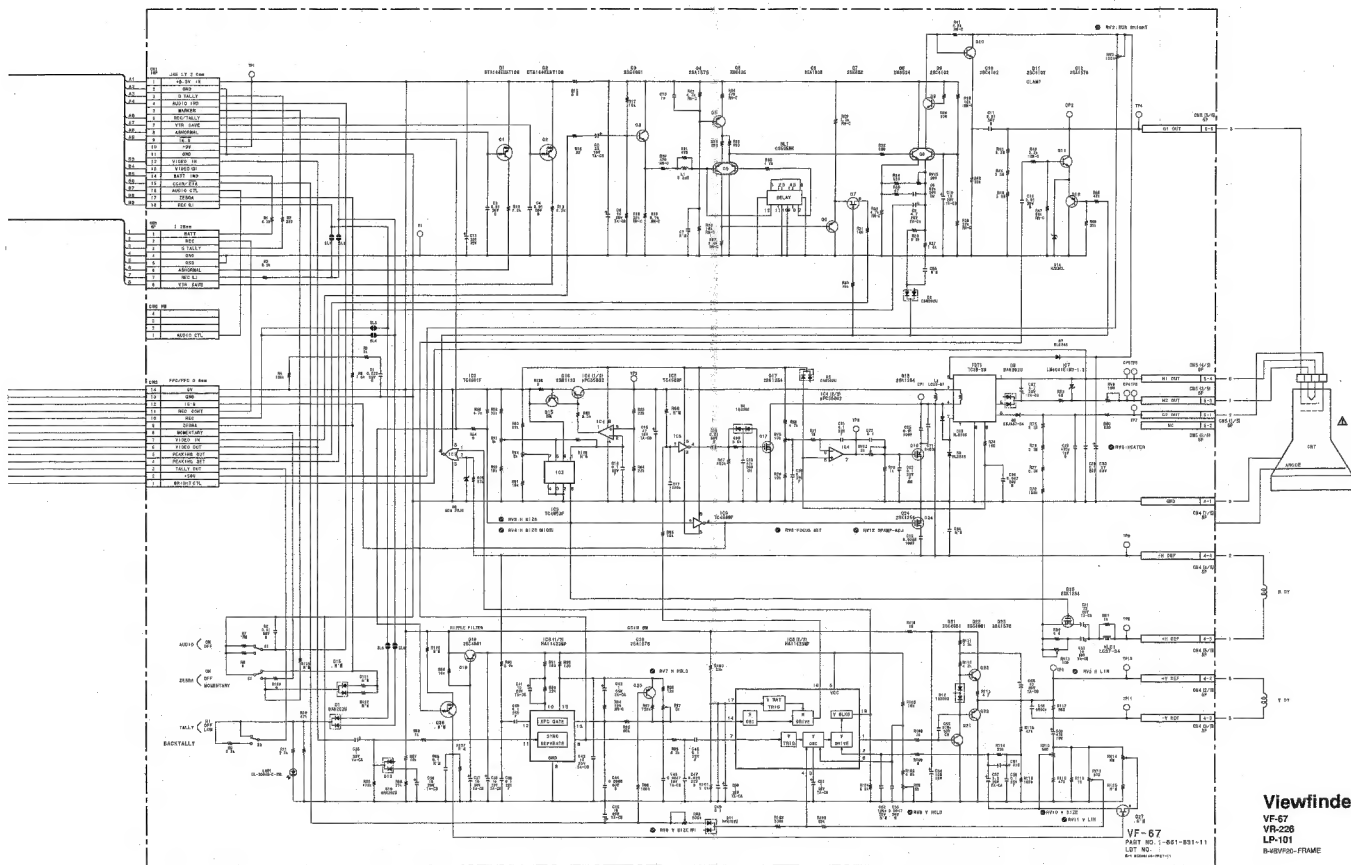
## Section 5

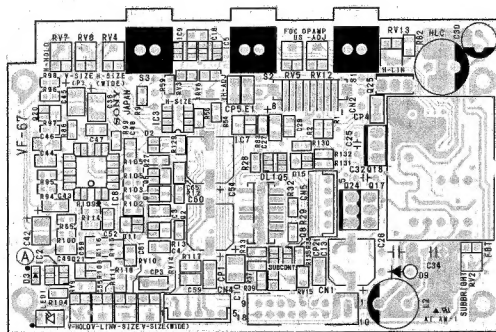
### Diagrams and Board Layouts



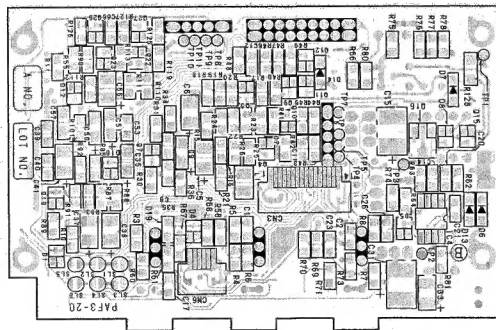
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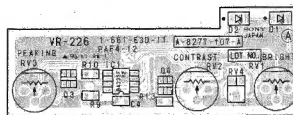




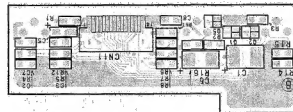
**VF-67 -A SIDE-  
SUFFIX:-11**



**VF-60 -B SIDE-  
SUFFIX:-11**



**VR-226-A SIDE-  
SUFFIX:-11**



**VR-226 -B SIDE-  
SUFFIX:-11**

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